GPS – GSM Integration for Enhancing Public Transportation Management Services

V.Prabhakaran, S.K.Monisuthan, P.Sam Daniel

Abstract— Due to non-availability of prior information about the buses arrival schedule, people have to wait longer on bus stops especially in morning when they have to reach the offices in time. The buses are overloaded for most of the times which often results in some kind of fault occurrence in buses and people get late further. This project proposes a solution for enhancing public transportation management services based on GPS and GSM, parameters like location of the bus, traffic density, no of passengers inside the bus is shown to the user in their mobile phone.

Index Terms— Microcontroller, GSP/GPS, IR sensor

1 INTRODUCTION

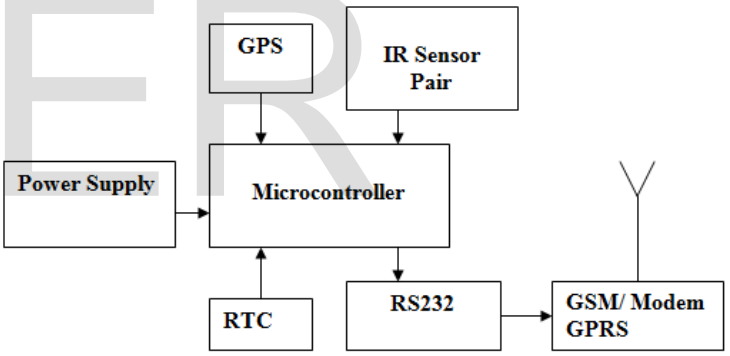
The system consists of three module, In-Bus Module, Bus Stop Module and user module which is equipped microcontroller and GSM/GPS modem. In-Bus Module sends the initialization of information containing the number of passenger in the bus, location of the bus, and the time of arrival to the BUS stop for particular destination using GPS/GSM Modem.

The microcontroller based Bus-Station Module consisting mainly of a GPS receiver and GPRS enabled GSM modem starts to receive the signal from In-Bus module and display the parameters like passenger count inside bus, bus location and time of arrival to that particular stop, where the user can see the display and check their availability of bus with its location in that stop. In addition to this a user module (mobile) is used to view the status of the bus location, time of arrival with passenger count in any place and at any instant. As an advent from this the user can check status of the bus before they come to their stop, incase if they miss the bus they can also find the other option to get another bus for their specific location, then starts transmitting its location and number of passengers to BASE Station Module. BASE Station Module equipped with a microcontroller unit and GSM modems interfaced to PCs is designed to keep track record of every bus, processes user request about a particular bus location out of BUS Station and updates buses location on bus stops. Server in the base station will have the IP address which is assigned to each GSM module fixed in the Bus to transmit the data continuously from longer distance. Pair of IR Sensors is fixed in the bus module to count the passenger of entry and exit and transmit the status of the crowd at that time.

- *V.Prabhakaran is currently working as Assistant professor in Department of Energy and Environemental Engineeringat Saveetha School of Engineering, Saveetha University, Thandalam, Chennai, PH – 9884634252. E-mail: prabhakaranprof@gmail.com*
- *S.K.Monisuthan is currently working as Assistant professor in Department of Electrical and Electronics Engineering at Saveetha School of Engineering, Saveetha University, Thandalam, Chennai, PH – 9790354058. E-mail: skmsuthan@gmail.com*
- *P.Sam Daniel is currently working as Assistant professor in Department of Electrical and Electronics Engineering at Saveetha School of Engineering, Saveetha University, Thandalam, Chennai, PH – 8870679553. E-mail: sjsamdaniel@gmail.com*

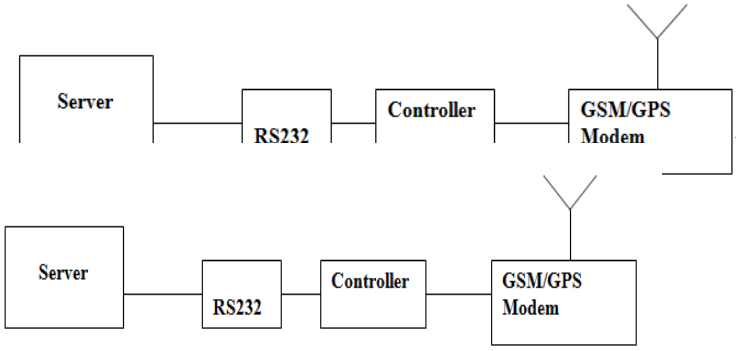
2. BLOCK DIAGRAM

2.1 IN – BUS MODULE



2.1.1 IN-BUS Module Explanation

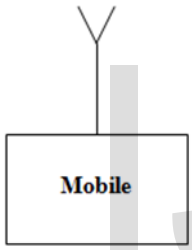
In-Bus module consist of Controller section interfaced to IR Sensor pair, GSM (GPRS) enabled module and GPS module. GPS will measure the location of the vehicle with RTC timer part to indicate the exact time of the location. Two pair of IR sensors is used to display the current status of the passengers in the bus (One pair for incrementing and other pair for decrementing). This IR sensor will be fixed one at the entry and one at the exit path. When the user enters into the bus then a count is initiated when the user leaves the bus then the count is decremented, by using this type of method the controller gets the exact count of the passengers inside the bus. Current location of the bus is obtained by GPS, the controller sends count of passenger and location via GPRS to Bus- Stop Module and also to user module.



2.2.1 Bus Stop Module Explanation

Bus Module consists of GSM/GPS Modem with a Server powered by microcontroller. The data from In-bus module is received by GSM/GPS Modem and it's processed by microcontroller and stored into a server for database storage. The controller also connects a LCD display to show all the parameters (passenger count, location and time of arrival). This information is shown to public in Bus stop, so a passenger can see his/her bus location, time of arrival and passenger count inside the bus and can take decision of which bus to get in.

2.3 USER MODULE



2.3.1 User Module Explanation

User module is our mobile phone, it is connected to GPS/GSM modem in the In-Bus module and gets the information (passenger count, time of arrival, location). The user can view the status of bus at certain instant of time.

CONCLUSION

As an embedded design this integrated module installed in MTC Bus and in Bus station will provide the information regarding loction, traffic density, no of passengers on the user mobile phone which gives a complete status of the bus which in turn allows the user to board on their bus at a correct time without waiting in bus stop.

REFERENCE

1. Peng Chen, Shuang Liu, **"Intelligent Vechile Monitoring System Based on GPS, GSM and GIS"** Information Engineering (ICIE), 2010 WASE International Conference on Volume : 1, DOI : 10.1109/ICIE.2010.17, Publication Year : 2010, Pages (s): 38-40.

2. Fleischer, P.B. ; Nelson, A.Y. ; Sowah, R.A. ; Bremang, A. "**Design and development of GPS/GSM based vehicle tracking and alert system for commercial inter-city buses"** Adaptive Science & Technology (ICAST), 2012 IEEE 4th International Conference on DOI: 10.1109/ICASTech.2012.6381056 Publication Year: 2012 , Page(s): 1 - 6 Cited by: Papers (1)

3. Banizaman, H. ; Torab, A. "**Fuzzy-Logic base ABS/GPS integration for vehicle navigation system in urban canyons"** Intelligent Computing and Intelligent Systems, 2009. ICIS 2009. IEEE International Conference on Volume: 2 DOI: 10.1109/ICICISYS.2009.5358244Publication Year: 2009 , Page(s): 880 – 884

4. Lei Wang ; Emura, T. ; Ushiwata, T. "**Automatic guidance of a vehicle based on DGPS and a 3D map"** Intelligent Transportation Systems, 2000. Proceedings. 2000 IEEE DOI: 10.1109/ITSC.2000.881036 Publication Year: 2000 , Page(s): 131 - 136 Cited by: Papers (5)

5. Alshaer, H. ; Horlait, E. "**Emerging client-server and ad-hoc approach in inter-vehicle communication platform"** Vehicular Technology Conference, 2004. VTC2004-Fall. 2004 IEEE 60th Volume: 6 DOI: 10.1109/VETECF.2004.1404819 Publication Year: 2004 , Page(s): 3955 - 3959 Vol. 6 Cited by: Papers (6)

6. Qiang Liu ; Huapu Lu ; Hongliang Zhang ; Bo Zou **"Research and Design of Intelligent Vehicle Monitoring System Based on GPS/GSM"** ITS Telecommunications Proceedings, 2006 6th International Conference on DOI: 10.1109/ITST.2006.288858Publication Year: 2006 , Page(s): 1267 - 1270 Cited by: Papers (4)

7. Prudhvi, B.R. ; Bagani, R. "**Silicon eyes: GPS-GSM based navigation assistant for visually impaired using capacitive touch braille keypad and smart SMS facility"** Computer and Information Technology (WCCIT), 2013 World Congress on DOI: 10.1109/WCCIT.2013.6618775 Publication Year: 2013 , Page(s): 1 – 3

8. **Silicon eyes: GPS-GSM based navigation assistant for visually impaired using capacitive touch braille keypad and smart SMS facility**

9. Saranya, J. ; Selvakumar, J. "**Implementation of children tracking system on android mobile terminals"** Communications and Signal Processing (ICCSP), 2013 International Conference on DOI: 10.1109/iccsp.2013.6577199 Publication Year: 2013 , Page(s): 961 - 965 Cited by: Papers (1)

10. Fritsche, C. ; Klein, A. "**On the Performance of Hybrid GPS/GSM Mobile Terminal Tracking"** Communications Workshops, 2009. ICC Workshops 2009. IEEE International Conference
on DOI: 10.1109/ICCW.2009.5207984 Publication Year: 2009 , Page(s): 1 - 5 Cited by: Papers (1)